UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/782,547	02/19/2004	Larry F. Rhodes	4262-031383	3252

7590 01/15/2008

Paul M. Reznick
WEBB ZIESENHEIM LOGSDON
ORKIN & HANSON, P.C.
436 Seventh Avenue, 700 Koppers Building
Pittsburgh, PA 15219-1818

EXAMINER	
HARLAN, ROBERT D	

ART UNIT	PAPER NUMBER
1796	

MAIL DATE	DELIVERY MODE
01/15/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte LARRY F. RHODES, DENNIS A. BARNES,
ANDREW BELL, BRIAN K. BENNETT,
CHUN CHANG, JOHN-HENRY LIPIAN,
and XIAOMING WU,
Appellants

Appeal 2007-2423
Application 10/782,547[1]
Technology Center 1700

Decided: January 15, 2008

Before PETER F. KRATZ, CAROL A. SPIEGEL and MARK NAGUMO, *Administrative Patent Judges*.

Opinion for the Board filed by Administrative Patent Judge
CAROL A. SPIEGEL

Opinion Concurring-in-part/Dissenting-in-Part filed by
Administrative Patent Judge PETER F. KRATZ

SPIEGEL, *Administrative Patent Judge*.

DECISION ON APPEAL

INTRODUCTION

---

[1] Application filed 19 February 2004 and said to claim priority benefit to provisional application 60/448,939, filed 21 February 2003. The real party-in-interest is said to be PROMERUS LLC (Appellants' Brief under 37 C.F.R. § 41.67, filed 28 August 1006 ("App. Br.") at 3).

Larry F. Rhodes, Dennis A. Barnes, Andrew Bell, Brian K. Bennett, Chun Chang, John-Henry Lipian and Xiaoming Wu ("Appellants") appeal under 35 U.S.C. § 134 from the final rejection of claims 1-40, 61, 63, 65, and 67 (App. Br. at 9; Ans.[2] at 5). Claim 41, the only other pending claim, stands withdrawn from consideration (App. Br. 5 Ans. 5). We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM-IN-PART. However, since our reasons for concluding that claims 1-3, 8, 9, 11, 15, 16, 24-27, 31, 33, and 34 are unpatentable differ substantially from those advanced by the Examiner, we denominate our affirmance as a NEW GROUND OF REJECTION. 37 CFR § 41.50(b).

SUBJECT MATTER ON APPEAL

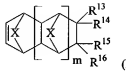
The subject matter on appeal is directed to methods of polymerizing poly(cyclic)olefin monomers using Ni and/or Pd catalysts and non-olefinic chain transfer agents; and, to unsaturated monomers having a defined formula. The resulting polymers are said to be useful in photoresist compositions. Claims 1 and 37 are illustrative and read as follows:

> 1. A method of polymerizing poly(cyclic)olefin monomers comprising:
>
> (a) combining a monomer composition comprising one or more poly(cyclic)olefin monomers, a non-olefinic chain transfer agent and an optional activator compound in a reaction vessel to form a mixture; and
>
> (b) adding a polymerization catalyst containing Ni and/or Pd ligated by a monodentate ligand, the catalyst causing the mixture to polymerize;

[2] Examiner's Answer mailed 15 November 2006 ("Ans.").

wherein the non-olefinic chain transfer agent includes one or more compounds selected from the group consisting of H_2, alkylsilanes, alkylaloxysilanes, alkylgermanes, alkylalkoxygermanes, alkylstannanes, and alkylalkoxystannanes.

37. An unsaturated monomer comprising Formula (Ia):



(Ia)

wherein X is selected from $-CH_2-$, $-CH_2CH_2-$, O, S and -NH-;

m is an integer from 0 to 5;

and each occurrence of R^{13}, R^{14}, R^{15} and R^{16} are independently selected from one of the following groups:

(a) H, C_1 to C_{25} linear, branched, and cyclic alkyl, aryl, aralkyl, alkaryl, alkenyl and alkynyl;

(b) C_1 to C_{25} linear, branched, and cyclic alkyl, aryl, aralkyl, alkaryl, alkenyl and alkynyl containing one or more hetero atoms selected from O, N, and Si;

(c) a hydroxy alkyl ether according to Formula (IVa):

$$-A-O-[(CR^{35}_{2-})_t-O-]_s-(CR^{17}_{2-})_t-OH \quad (IVa)$$

wherein A is a linking group selected from C_1 to C_6 linear, branched, and cyclic alkylene, each occurrence of R^{17} is independently selected from H, methyl and ethyl, R^{35} is independently selected

> from H, methyl, ethyl and a halide, t is from 1 to 5, and s is from 0 to 3; and
>
> wherein at least one of R^{13}, R^{14}, R^{15} or R^{16} comprise [sic, comprises] the hydroxyalkyl ether of Formula (IV) [sic, IVa].

[App. Br. 17 and 25; emphasis added.]

THE REJECTION AND ISSUES

The Examiner maintains that claims 1-40, 61, 63, 65 and 67 are anticipated by Arthur[3] under 35 U.S.C. § 102(a) (App. Br. 14; Ans. 4-5; Final Rejection[4] 2).

At issue is whether Arthur describes (i) a polymerization catalyst containing Ni and/or Pd ligated by a monodentate ligand as recited in claim 1; (ii) use of an alkylsilane chain transfer agent as recited in claim 25; (iii) use of a Pd catalyst as recited in claims 28-30; or, (iv) an unsaturated monomer of Formula Ia as recited in claim 37 (App. Br. 14).

FINDINGS OF FACT ("FF")

The following findings of fact are supported by a preponderance of the evidence of record.

A. Appellants' Application

[1] There is said to be a need for photoresists, including norbornene-type structures, having both low molecular weights and low ODs at short radiation wavelengths (Specification, ¶ 4).

[2] Appellants' specification describes low molecular weight (less than about 20,000) polymers having low ODs (less than ~0.15 at 193 nm

[3] Arthur et al ("Arthur"), U.S. Patent 6 ,372,869 B1, issued 16 April 2002.
[4] Office Action mailed 13 February 2006 ("Final Rejection").

and less than ~1.5 at 157 nm), suitable for use in photoresist compositions (Specification, ¶¶ 27-28; abstract).

[3] The polymers are formed by (a) combining a monomer composition including a poly(cyclic)olefin monomer, a non-olefinic chain transfer agent and an optional activator compound in a reaction vessel to form a mixture; (b) optionally heating the mixture to a first temperature; and, (c) adding a polymerization catalyst containing Ni and/or Pd to cause the mixture to polymerize (Specification, ¶¶ 28-29).

[4] Exemplary chain transfer agents include H_2 and alkylsilanes, e.g., triethylsilane and tri-*i*-propylsilane (Specification, ¶ 38).

[5] Exemplary poly(cyclic)olefin monomers include α,α-bis(trifluoromethyl)bicyclo[2.2.1]hept-5-ene-2-ethanol (HFANB), 5 norbornene-2-methanol hydroxylethylether, hydroxylethylester of 5-norbornene carboxylic acid (Specification, ¶¶ 7 and 57).

[6] Exemplary catalysts include palladium complexes ligated by Group 15 ligands (i.e., N, P, As, Sb and Bi) and organonickel complexes (Specification, ¶ 73).

[7] Exemplary nickel catalyst complexes may be represented by

$$[LnNi(R^{ewg})_2]$$

wherein n is 0, 1 or 2;

L is a monodentate ligand (e.g., π-arenes, such as toluene, benzene and mesitylene; ethers, such as tetrahydrofuran, dioxane or diethylether; esters, such as ethyl-, methyl- or propyl-acetate) (Specification, ¶ 89); and,

R^{ewg} is an electron withdrawing ligand, such as perhaloalkyl, perhaloaryl and perhaloalkyaryl ligands (Specification, ¶ 90).

B. Arthur

[8] Arthur describes a polymerization method which controls the molecular weight of the product polymer, comprising contacting (a) one or more olefin monomers; (b) a non-olefinic chain transfer agent selected from the group consisting of hydrogen, CBr_4 and a compound of the formula $R^1R^2R^3SiH$, wherein R^1 and R^2 are alkyl and R^3 is hydrogen or alkyl, preferably triethylsilane; and, (c) a polymerization catalyst comprising Ni, Fe or Co complexed with a bidentate ligand (Arthur 1:48-65 and 12:21-23).

[9] In particular, Arthur describes a catalyst comprising Ni complexed to a ligand of any of formulae (IV) through (XXXVII) (Arthur 1:66 through 7:63).

[10] The ligand of formula (XI) has the structure

wherein R^{38}, R^{39} and R^{40} are each independently hydrogen, hydrocarbyl, substituted hydrocarbyl or an inert functional group; and R^{37} and R^{41} are each independently hydrocarbyl, substituted hydrocarbyl or an inert functional group whose E_s is about -0.4 or less (Arthur 2:42-50 and 6:15-20).

[11] Preferred substitutents for substituted hydrocarbyls are halo, ester, amino, imino, carboxyl, phosphite, phosphonite, phosphine, phosphinite, thioether and amide (Arthur 8:4-14).

[12] Useful monomers include ethylene, propylene or other α-olefins of the formula R^{150} CH=CH_2, wherein R^{150} may be a cyclopentene, a styrene or a norborene (Arthur 11:52-55).

C. The Examiner's Rejections

[13] The Examiner finds that Arthur teaches a process of polymerizing cyclic olefins in the presence of a chain transfer agent and a Ni catalyst formed by contacting Ni with a monodentate ligand, i.e., phenol derivatives of formula XI[5] (Ans. 4).

[14] According to the Examiner, the only potential point for a metal to complex with Arthur's phenolic ligand is the oxygen of its hydroxyl group and, therefore, Arthur's phenolic ligand is a monodentate ligand (Ans. 4-5).

[15] The Examiner has not supported this finding with any evidence in the present record; nor has the Examiner directed our attention to any evidence of record indicating that phenol will be monodentate in the catalysts described by Arther as "bidentate."

[16] The Examiner has not directed our attention to descriptions by Arther of the polymerization of any monomer containing a hydroxyl (-OH) group.

[17] The Examiner further finds that "Claims 28-30 and 37-40 are rejected for depending on a rejected based [sic] claim" (Ans. 5).

[5] "In two telephone conversations with the Examiner conducted with Bernard Berman, Esq., it was pointed out by Mr. Berman, and recognized by the Examiner, that the correct structure the Examiner meant to refer to in the Office Action is formula XI, not formula XII, at column 2 of the '869 patent [i.e., Arthur]" (App. Br. at 13, bracketed text added).

[18] The Examiner acknowledged the Reply Brief and Rabinowitz (Communication[6] 1.)

D. Appellants' Arguments

[19] Appellants argue that since Arthur is directed only to bidentate ligands, ligand XI of Arthur is a bidentate ligand and, thus, Arthur cannot anticipate claims 1-36, 61, 63, 65, and 67 (App. Br. 14).

[20] Appellants further argue that Arthur does not disclose use of a Pd metal catalyst and, therefore, cannot anticipate claims 28-30 (App. Br. 14).

[21] Appellants still further argue that Arthurs does not disclose use of an alkylsilane chain transfer agent and, therefore, cannot anticipate claim 25 (App. Br. 14).

[22] Appellants finally argue that Arthur neither teaches nor suggests an unsaturated monomer as recited in independent claim 37 and, therefore, cannot anticipate claims 37-40 (App. Br. 14).

[23] In reply to the Examiner's position that phenol is a monodentate ligand, Appellants submit an article by Rabinovich[7] said to show that phenol, and derivatives thereof, are bidentate ligands (Reply Br.[8] 4).

ANTICIPATION

[6] Communication acknowledging, entering and considering the Reply Brief and Rabinowitz mailed 6 April 2007 ("Communication").

[7] Rabinovich et al. ("Rabinovich"), "Synthetic, Structural, and Mechanistic Studies of the C-H Bond Activation of Phenols by $W(PMe_3)_6$ and $W(PMe_3)_4(\eta^2\text{-}CH_2PMe_2)H$," *Journal of the Americal Chemical Society*, Vol. 114, pp. 4611-4621 (1992).

[8] Reply Brief to Examiner's Answer Pursuant to 37 C.F.R. § 41.41(a) filed 16 January 2007 ("Reply Br.").

Claimed subject matter is anticipated if "each and every limitation is found either expressly or inherently in a single prior art reference." *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1374 (Fed. Cir. 2001). "Absence from the reference of any claimed element negates anticipation." *Kloster Speedsteel AB v Crucible, Inc.*, 793 F.2d 1565, 1571 (Fed. Cir. 1986).

There is no substantive rejection of claims 28-30 and 37-40 but only an objection due to claim form (FF 17). Therefore, we REVERSE the rejection of claims 28-30 and 37-40 under § 102 as anticipated by Arthur.

Since Arthur discloses using alkylsilanes as chain transfer agents and triethylsilane as a preferred silane (FF 8), the patentability of all the remaining claims on appeal, i.e., claims 1-27, 31-36, 61, 63, 65, and 67, depends upon whether Arthur describes a polymerization catalyst containing Ni ligated by a monodentate ligand as recited in claim 1.

As noted by Appellants (App. Br. 14), Arthur describes a process using a polymerization catalyst comprising Ni, Fe or Co complexed with a bidentate ligand (FF 8). The Examiner maintains that the phenolic ligand of Formula XI described by Arthur can only be a monodentate ligand (FF 14). The Examiner, however, does not support this finding with evidence of record. This "finding," however plausible, is mere argument. We note, moreover, that Arthur expressly prohibits all five of the R groups, R^{38}-R^{41}, from each being independently hydrogen (FF 10). The Examiner fails to address how the specified R group substitutents would affect the ligating ability of the phenolic ligand of Formula XI. We note that preferred R^{38}-R^{41} substituents include amino, imino, carboxyl, phosphite, phosphonite,

thioether and amide substituted hydrocarbyls (FF 11), all of which would appear to render the substituted phenol potentially bidentate.

Moreover, the Examiner has not challenged Appellants' proffered evidence (Rabinovich) showing that phenol may be a bidentate ligand , at least in certain circumstances (FF 23; Communication[9] 1). Therefore, the evidence advanced by Appellants outweighs the evidence advanced by the Examiner

Based on the foregoing, we REVERSE the Examiner's rejection of claims 1-27, 31-36, 61, 63, 65, and 67 under § 102 as anticipated by Arthur.

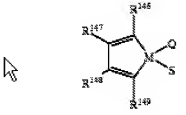
NEW GROUND OF REJECTION

Appellants' specification teaches exemplary nickel catalysts having the formula

$$[LnNi(R^{ewg})_2],$$

where L is a monodentate ligand and R^{ewg} is an electron withdrawing ligand such as perhaloalkyl (FF 7). The record indicates that perhaloakyl ligands are monodentate ligands. In the absence of a specialized definition of the term "monodentate ligand" in Appellants' specification, we find that compounds (XXXXI) of Arthur, having the formula

(XXXXI)



[9] The Answer could not address the later-filed Reply Brief. Thus, in acknowledging the Reply Brief and Rabinowitz without substantive comment, the Examiner did not challenge Appellant's proffered evidence.

contain monodentate ligands Q and S (Arthur 11:4-27). Specific embodiments of such ligands are Q = S = Br (e.g., Arthur 12:42 through 13:18 (Example 1)) and Q = S = 2-ethylhexanoate (Arthur 13:38 through 14:11 (Example 2)). In these examples, M is nickel and the chain transfer agent is H_2. As pointed to by the Examiner (Ans. 4), polycyclic olefins including α-olefins $R^{150}CH=CH_2$, wherein R^{150} can be norbornene and dicyclopentadiene, are described as monomers polymerizable by the catalysts (Arthur 8:53 through 9:5; 11:52-55).

For these reasons and for the reasons explained *supra*, claims 1-3, 8, 9, 11, 15, 16, 24–27, 31, 33, and 34 are anticipated by Arthur. We note that the monomer limitation recited in claims 8, 9, 11, 15, and 16 each encompasses monomers wherein R^1 through R^4 are all hydrogen (see claim 8, subpart a)). While claim 11 further limits the monomer of claim 8, subpart d) and claims 15 and 16 further limit the monomer of claim 8, subpart b), none of claims 11, 15 nor 16 limit the Markush group of claim 8 to the members recited in subparts b) or d). Therefore, the monomer limitation in claims 11, 15 and 16 are all met by monomers wherein R^1 through R^4 are hydrogen as recited in claim 8, subpart a).

CONCLUSION

Upon consideration of the record and for the reasons given, it is

ORDERED that the Examiner's rejection of claims 4-7, 10, 12-14, 17-23, 28-30, 32, 35-40, 61, 63, 65, and 67 under 35 U.S.C. § 102(b) as unpatentable over Arthur is REVERSED; and,

FURTHER ORDERED that claims 1-3, 8, 9, 11, 15, 16, 24-27, 31, 33, and 34 are unpatentable under 35 U.S.C. § 102(b) over Arthur. However, since our reasons for concluding that the claims are unpatentable

differ substantially from those advanced by the Examiner, we enter our affirmance as a NEW GROUND OF REJECTION. 37 CFR § 41.50(b).

Section 41.50(b) also provides that *WITHIN TWO MONTHS FROM THE DATE OF THE DECISION*, Appellants must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

> (1) *Reopen prosecution*. Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .
>
> (2) *Request rehearing*. Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

Should the appellant elect to prosecute further before the examiner pursuant to 37 CFR § 41.50(b)(1), in order to preserve the right to seek review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the prosecution before the examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If the appellant elects prosecution before the examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

AFFIRMED-IN-PART; 37 CFR § 41.50(b)

Kratz, *Administrative Patent Judge*, concurring-in-part/dissenting-in-part

I concur with the majority's decision to reverse the Examiner's anticipation rejection of claims 1-40, 61, 63, 65, and 67 under 35 U.S.C. § 102 as being anticipated by Arthur.[10] However, I respectfully dissent from the majority decision to introduce a new ground of rejection of claims 1-3, 8, 9, 11, 15, 16, 24-27, 31, 33, and 34 as anticipated by Arthur and in so doing asserting an affirmed-in-part disposition for the matters brought before this panel on appeal. In my view, the evidence proffered by the Examiner, as further parsed and explicated by the majority, does not fairly present a prima facie case of anticipation of claims 1-3, 8, 9, 11, 15, 16, 24-27, 31, 33, and 34. Therefore, I do not join the majority's order in so far as a § 102(b) rejection of claims 1-3, 8, 9, 11, 15, 16, 24-27, 31, 33, and 34 over Arthur is being introduced as a new ground of rejection. To the extent that an affirmed-in-part disposition as to this appeal is being maintained by the majority, I respectfully dissent.

"To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently." *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997); *accord Glaxo, Inc. v. Novopharm, Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir. 1995). However, anticipation by a prior art reference does not require that the reference

[10] It is noted that the Reply Brief is not in compliance with 37 C.F.R. § 41.41(a)(1) in that new evidence is included in the discussion therein. Indeed, the citation of new evidence in support of the rejection by the Examiner in the Answer appears out of order absent a new ground. The majority has not affirmed any of the Examiner's rejections, at least absent the new ground basis therefore. Thus, the inappropriateness of the Examiner's actions in relying on new evidence in the Answer and with regard to entering and consideration of the non-conforming Reply Brief are seemingly moot.

recognize either the inventive concept of the claimed subject matter or the inherent properties that may be possessed by the prior art reference. *See Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 633 (Fed. Cir.), *cert. denied*, 484 U.S. 827 (1987). For a rejection under 35 U.S.C. § 102 to be proper, the anticipating reference must clearly and unequivocally disclose the subject matter of the rejected claims or direct those skilled in the art to the subject matter without any need for picking, choosing and combining various disclosures not directly related to each other by the teachings of the reference. *In re Arkley*, 455 F.2d 586, 587 (CCPA 1972).

Anticipation under this section is a factual determination. *See In re Baxter Travenol Labs.*, 952 F.2d 388, 390 (Fed. Cir. 1991) (citing *In re Bond*, 910 F.2d 831, 833 (Fed. Cir. 1990).

Here, the majority has not established, prima facie, how selection of a species of compound Formula XXXXI of Arthur, which appears to be a metal complex formula used by Arthur for forming an active polymerization catalyst in situ, coupled with the ethylene polymerization Examples 1 and 2, the possible selection of other cyclic monomers and, finally the selection of a chain transfer agent from among those disclosed by Arthur amounts to an anticipating disclosure of Appellants' method claim 1 and the other rejected claims. Appealed claim 1 involves polymerization of one or more poly(cyclic)olefin monomers. Aside from the necessary selections (see, e.g., col. 11, ll. 46-51 of Arthur), the majority does not even address how the referred to portions of the disclosure of Arthur describe both the mixture formation combining step and the separate catalyst addition step of claim 1, which latter step causes the mixture formed in the combining step to polymerize.

It is the Office's burden to establish a prima facie case of unpatentability. On the present record, the majority has not marshaled the cited evidence so as to establish, by a preponderance of the evidence, that Arthur furnishes a description of the subject matter required by the claims subjected to the new anticipation ground of rejection.

Thus, I do not join the majority in their decision to introduce a §102(b) rejection of claims 1-3, 8, 9, 11, 15, 16, 24-27, 31, 33, and 34 over Arthur.

Paul M. Reznick
WEBB ZIESENHEIM LOGSDON
ORKIN & HANSON, P.C.
700 Koopers Building
436 Seventh Avenue
Pittsburgh, PA 15219-1818

~~APJ Initials~~

~~CAS~~

~~Mn~~

~~PFK~~

mg